Food & Nutrition

Research Briefs

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Nutrition and Health

Brisk walking several times a week along with extra calcium can help prevent osteoporosis, according to a year-long study. A group of 18 women in their 50's and 60's walked at a pulse-raising pace for 45 minutes 4 times a week, while a second group of 18 maintained their sedentary lifestyles. Half of each group got an extra 800 milligrams of calcium daily to see if the mineral alone, or in combination with walking, could stem bone loss. Both paid off—but in different bones. The walkers actually increased spine bone by an average 0.5 percent during the year, while the sedentary women lost 7 percent, regardless of their calcium intake. Getting extra calcium, on the other hand, increased bone at the hip an average 2 percent in both the walkers and nonwalkers, compared to a 1.1 percent loss in those who got a placebo instead. That's good news for those who don't want to join the one-third of American women over 65 who have fractures of spinal vertebrae, or the one-third in their 80s who have hip fractures.
Human Nutrition Research Center on Aging at Tufts
Boston, MA
Miriam Nelson, (617) 556-3075

Evidence that a higher vitamin C intake may protect the eye's lens against cataracts is now more convincing. Researchers have shown that taking a large daily dose of the antioxidant vitamin increases its levels in people's lenses and in the fluid surrounding it—known as the aqueous humor. It is thought that higher concentrations of vitamin C in these tissues protect lens proteins from oxidation. That process damages the proteins, which then accumulate to cloud the lens. In a study of patients scheduled for removal of cataracts, 42 agreed to take either an extra 2 grams of vitamin C (ascorbic acid) or a placebo for at least 2 weeks prior to surgery. Those who got the supplement had 49 percent more ascorbic acid in their lenses and 32 percent more in their aqueous humor fluid than those who got the placebo. This was surprising because the placebo group reported an average ascorbic intake nearly 2.5 times the RDA of 60 milligrams per day—a level believed to provide adequate body stores of the vitamin. Ascorbic acid is far more concentrated in human lenses and aqueous humor fluid than in blood plasma, indicating these tissues actively take the vitamin from the blood. Apparently, an intake of 2.5 times the RDA still does'not provide the optimal level in these tissues.
Human Nutrition Research Center on Aging at Tufts
Boston, MA
Allan Taylor, (617) 556-3155

Mosquito relief for campers can be built into their tents. Permethrin, a widely used mosquito control chemical, lasts 6 to 9 months when applied to tent material—both in knocking down the total number of mosquitoes entering a tent and reducing the number of bites the people inside get. An ARS study found that people got no bites or very few for up to 9 months. Tents made of polyester with nylon-permethrin coating were kept outside for an entire year—an unlikely situation for the average camper or even military personnel. These results indicate that the chemical adheres to tent material so well that one treatment would probably last the tent's life. Thanks to previous ARS studies, permethrin is approved for application to civilian clothing in all 50 states. Since it was registered by the Environmental Protection Agency, permethrin is being used on U.S. military clothing and was widely available to troops in the Persian Gulf during Operation Desert Storm.
Medical and Veterinary Entomology Research Lab,
Gainesville, FL
Carl E. Schreck, (904) 374-5968

A parasite native to Thailand could be a new biological control for mosquitoes like *Aedes aegypti* that breed in standing water such as in old tires. The tiny parasite—

Edhazardia aedis—attacks mosquitoes with two kinds of infective spores: one type floats in still water where mosquitoes live and the second is produced in infected female mosquitoes and passed on to her offspring. This makes the parasite a good candidate for biocontrol, because infected females would fly to a new spot to lay eggs and thus transmit the disease to a new population. In lab tests, the parasite infects and kills up to 100 percent of larvae in a container—depending on the dosage of spores. But researchers don't expect control quite that good in the field, generation after generation. Small scale field tests may begin as soon as approval from the Environmental Protection Agency is received.
Medical and Veterinary Entomology Research Lab
Gainesville, FL
Albert H. Undeen, (904) 374-5966

Stearic acid—a principal component of beef fat reported to reduce cholesterol levels—also helps the body absorb iron, even from plant foods. Researchers have shown that this saturated fatty acid is at least part of the reason why beef fat enhances iron absorption better than other animal fats. They compared stearic acid or beef tallow—a rich source of the fatty acid—with safflower oil on iron-deficient rats. The rats that got stearic acid or beef tallow overcame their anemia and increased the amount of iron stored in their livers better than those that got highly unsaturated safflower oil. Women who tend to be anemic may be wise to keep some beef in their diets.
Grand Forks Human Nutrition Research Center
Grand Forks, ND
Phyllis E. Johnson, (701) 795-8395

Older women can actually increase spine bone density by getting extra vitamin D—the "sunshine vitamin"—during the dark days of winter in addition to getting adequate calcium, a study shows. The lack of sunlight in the temperate zone from mid fall to mid spring leads to a deficiency in the vitamin, which helps the body absorb calcium and phosphorus from foods and deposit these minerals in bones. Researchers measured bone density in 247 women past menopause during a year-long study. In addition to getting 800 milligrams of calcium per day, half of the women got an extra 400 International Units (I.U.) of vitamin D, while the other half got a placebo. Both groups gained about the same amount of density in their spines during the summer and fall months when exposure to the sun prompts the skin to manufacture enough of the vitamin. And both lost density during the winter and spring months. But the group getting extra vitamin D lost only half as much, giving them an overall increase in spine bone of 0.85 percent for the year compared with no net gain for the placebo group. Unfortunately, 400 I.U. of the vitamin is difficult to get from the diet, so vitamin supplements would be necessary.
Human Nutrition Research Center on Aging at Tufts
Boston, MA
Bess Dawson-Hughes, (617) 556-3064

As part of a balanced diet, polyunsaturated fats—like those in vegetable oil—don't appear to lower your levels of "good" HDL cholesterol as studies elsewhere had indicated. That's a preliminary finding from a new 8-week study. HDL (high-density-lipoprotein) cholesterol is thought to lower the risk of heart disease so a reduction is an unwanted effect. HDL in 11 healthy, middle-age male volunteers dipped slightly at the midpoint of the study but returned to original levels by the end of the 8 weeks. Volunteers followed guidelines recommended by the American Heart Association: fats were no more than 30 percent of the day's calories and fat intake was balanced among three types—saturated, monounsaturated and polyunsaturated. Now the scientists are scrutinizing the other two kinds of fats, to determine which type lowers HDLs.
Western Human Nutrition Research Center
San Francisco, CA
James M. Iacono/Rita M. Dougherty, (415) 556-5657

Vinegar and rice bran oil could become the salad dressing of choice for people who want to lower their blood cholesterol. The latest findings of the oil's potential to lower cholesterol when substituted for saturated fat in the diet come from studies of monkeys by researchers with the University of Massachusetts, Lowell, and ARS. The oil is unique in that it contains all three substances—tocotrienol, oryzanol and ample amounts of plant sterols—known to either reduce circulating cholesterol or protect it from being oxidized to a more damaging form. Researchers fed the monkeys about two tablespoons of rice bran oil alone and in blends with other oils, accounting for 35 percent of their total daily calories as fat. Rice bran oil alone produced the greatest reductions in cholesterol—up to 40 percent when the animals' levels were highest after eating a typical U.S. diet. Only the damaging LDL cholesterol dropped, while the beneficial HDL cholesterol stayed constant or rose slightly. A second study confirmed the findings, showing that LDL cholesterol drops 1 percent for every 1 percent of rice bran oil substituted in the diet. Many grocery and health food stores carry rice bran oil, currently available only from Japan. Researchers are working to get domestic supplies of the oil.
Human Nutrition Research Center on Aging at Tufts
Boston, MA
Lynne M. Ausman, (617) 556-3163
University of Massachusetts Lowell, MA
Robert J. Nicolosi, (508) 934-4501

Milk is unlikely to interfere with the body's uptake of iron from cereals eaten at the same meal. That's good news for women who are consuming more calcium-rich dairy products to prevent osteoporosis. In an eight-week study, eight young women either drank non-fat milk, or skipped it when eating cereal products such as English muffins, whole-wheat hot cereal or brown rice casserole. Studies elsewhere had suggested that calcium in milk might limit iron absorption, but this didn't occur. The findings are also important

for vegetarians and people who are eating less red meat. To avoid iron-deficiency anemia, they have to make sure to get enough usable iron from their food. The iron they rely on—from grains and vegetables—is only one-fifth as absorbable as iron in red meat.
Western Human Nutrition Research Center
San Francisco, CA
Judith R. Turnlund, (415) 556-5662

More than one in five older Americans may need to take vitamin B_{12} supplements to prevent neurological disorders and senility. These people no longer secrete enough stomach acid to absorb B_{12} from foods as well as they used to. The condition, known as atrophic gastritis, affects at least 20 percent of people over the age of 60, increasing to about 40 percent of people over 80. A study of 16 subjects, half of whom had atrophic gastritis, showed that low acidity in the gastrointestinal tract impairs absorption of the protein-bound B_{12} found in foods. But it does not impair absorption of the crystalline form used in supplements. Poor absorption of the vitamin may be responsible for age-related declines in balance and pressure sensation, in muscle coordination and in mental ability. However, the severe B_{12} deficiency that leads to pernicious anemia is caused by other factors.
Human Nutrition Research Center on Aging at Tufts
Boston, MA
Robert M. Russell, (617) 556-3335

Tomorrow's Foods

French fries made with Ranger Russet, a new potato variety, taste better than those made with Russet Burbank, the industry's most popular variety. That's according to a panel of trained taste testers, who also gave Ranger high marks for color and texture. Ranger potatoes make crispier fries because they're higher in solids and so absorb less oil during deep frying. Processors like large potatoes with squarish ends, like Ranger, because they yield long french fries with less waste. The new spud also produces up to 28 percent more high-quality, U.S. No. 1 potatoes than the Burbank. Industry cooperators and state agriculture scientists from six states were involved with ARS in the testing and release of Ranger, which is available from certified seed growers in several states.
Small Grains and Potato Germplasm Research Unit
Aberdeen, ID
Joseph J. Pavek and Dennis L. Corsini, (208) 397-4181

Rambutan, an odd-looking but tasty fruit, might someday share the produce section with other tropical fruits like bananas and pineapples. ARS researchers are appraising unique rambutans that might appeal to U.S. growers and consumers. Rambutan looks something like a red or yellow egg sporting long, soft spines. The easily removed spines and peel cover translucent white flesh with a crisp, juicy texture somewhat like a grape. The flavor is hard to describe but usually sweet, pleasant and mild. Seedlings of two unusual rambutans collected in Borneo, are thriving at an ARS gene bank in Hawaii. One type, the giant rambutan, yields fruit almost twice as large as the typical golf-ball-size rambutan. Another, a wild rambutan, bears uncommonly dark purplish-red fruit with a sweet-tart taste. Native to Malaysia, rambutan can be eaten fresh—either alone or in salads or desserts—or canned, stewed or made into jams and jellies. Thailand exports $2.5 million worth of canned rambutan each year.
National Clonal Germplasm Repository for Tropical and Subtropical Fruit and Nut Crops, Hilo, HI
Francis T.P. Zee, (808) 959-5833
Subtropical Horticulture Research Station, Miami, FL
Robert J. Knight, Jr./Raymond J. Schnell, Jr., (305) 238-9321

An experimental fruit has unusual parents—tropical passion fruit and maypop, a weed native to Maryland. About the size of a baseball with citrus-like flesh, the color of the new fruit's smooth skin ranges from greenish-yellow to purplish-green. It smells like a topical passion fruit, and the sweet-sour tasting juice can be used alone or mixed with other juices. As yet unnamed, the fruit gets its cold-hardiness from the maypop weed. Field tests at Byron, Georgia, look promising. It produces fruit resistant to disease and insects. This potential alternative crop could be available to growers in 3 to 5 years.
Subtropical Horticulture Research Lab, Miami, FL
Robert J. Knight, (305) 238-9321
Southeastern Fruit and Tree Nut Research Lab, Byron, GA
A. Ann Amis, (912) 956-5656

Tomorrow's cookies, muffins and breads could be made from a crop that today feeds livestock and wildlife. Cattle, sheep and horses graze pastures of intermediate wheatgrass; rabbits and deer nibble on the plants' tender shoots. Taste tests now show that people like the taste, texture and appearance of chocolate-chip oatmeal cookies, banana bread, and other baked goods made exclusively with intermediate wheatgrass flour or with a blend that included whole-wheat flour. As a perennial, wheatgrass could prove a useful alternative crop for growers with hilly, erosion-prone land that can't withstand the wear of seeding and tilling annual crops such as wheats, oats and rye. However, it will not compete directly with commercial wheat—the only grain that can be made into a dough that rises and provides light, fluffy baked goods. To meet its potential for flour production, new wheatgrasses would need to be bred for a high output of kernels for milling. And markets and guidelines for millers and bakers would need to be developed.
Western Regional Research Center, Albany, CA
Robert Becker, (415) 559-5680
Northern Great Plains Research Lab, Mandan, ND
John D. Berdahl, (701) 663-6445

Food Freshness and Safety

Salmonella bacteria can't digest certain naturally occurring sugars found in wheat, onions and garlic, so researchers are combining these sugars with various harmless bacteria in chicken feed. The combination literally crowds out intestinal *Salmonella* in young chickens. The sugars—known as fructoogligosaccharides or FOS—make a chicken's intestines inhospitable for the "bad" bacteria while encouraging growth of the "good" bacteria, which naturally occur in the chicken's intestines. As a bonus, researchers say, FOS could replace antibiotics now added to feed to promote growth in the birds.
Poultry Microbiological Safety Research, Athens, GA
Joseph S. Bailey, (404) 546-3356

An artificial flower is part of a novel system that attracts and kills female cabbage looper moths without harming the environment. The ARS-developed flower resembles a blossom of the tropical night-blooming jessamine shrub and has a glass capillary tube filled with sugar, an ARS-developed perfume resembling the real flower's scent, and an insecticide called methomyl. Adult females searching for nectar pick up the scent and spot the blossom. They insert their proboscis into the capillary tube, sucking up the deadly mixture—and avoiding any distribution of the insecticide into the environment. In flight tunnel tests—in which adult insects must fly against a wind current to reach the scent and artificial flower—100 percent control was achieved. Every moth was attracted, fed on the dispenser, and died within several minutes. Results from field cage tests are being tabulated now.
Insect Attractants, Behavior and Basic Biology Research Lab, Gainesville, FL
Peter J. Landolt, (904) 374-5756

Processed orange juice that tastes fresh squeezed is being commercially tested by a juice processing company. Because of heat during pasteurization, it's almost impossible to keep the delicate balance of flavors in fresh orange juice. But by using gas chromatography, ARS scientists found a method to restore to processed juice the original mix of 20 flavor components in fresh juice.
Citrus and Subtropical Products Research Lab
Winter Haven, FL
Philip E. Shaw, (813) 293-4133

Accurate food-safety tests for processed meats are simpler with a new "soup" for growing two major food-poisoning bacteria. Each year, the food industry runs about 7 million tests for *Salmonella* and 4 million for *Listeria*. But with the new ARS-patented broth, companies can run the same number of tests with half as many preparatory steps. That could save the industry $5-$7 million a year with no loss in accuracy. The current preparatory steps require processors to incubate food samples for 24 hours in two separate broths—one for *Salmonella* and one for *Listeria*. With the new medium, both bacteria can be incubated together. The preparatory step is followed by incubation in a separate broth specific for each pathogen.
Poultry Microbiological Research, Athens, GA
Stan Bailey, (404) 546-3356

Keeping fruit flies out of fresh Hawaiian papayas bound for the U.S. mainland is now easier and more economical for packers and shippers. After testing more than 51,000 papayas, ARS scientists won federal approval for a simplified, forced-hot-air process that allows packinghouses to fly-proof the fruit in bulk-bin loads of about 600 papayas each. Previously, the technique was approved only for single layers of fruit in boxes or trays—costlier and more time-consuming than the bulk process. The process requires no chemicals and doesn't damage papayas' taste or texture. In the bins, papayas are gradually heated for about 6 hours with hot air kept at a relative humidity of 40 to 60 percent. This brings the fruit's temperature to 117 degrees F—lethal to any oriental or Mediterranean fruit flies or melon flies that might be hiding inside. Heated fruit is later cooled with water.
Tropical Fruit and Vegetable Research Lab, Hilo, HI
John W. Armstrong, (808) 959-9138

Young walnut trees growing in a northern California research orchard boast a gene that may thwart their insect enemies. That would enable growers to use less insecticides in orchards and packers to use less fumigant to protect stored walnuts from attacks by the caterpillar offspring of several moths. Using a technique developed in cooperation with ARS, researchers at the University of California at Davis gave the trees a mothproofing gene borrowed from the soil bacterium *Bacillus thuringiensis*, or Bt. The gene should enable trees to manufacture a Bt protein known to kill caterpillars of the codling moth, navel orangeworm and Indianmeal moth. ARS scientists will determine if the Bt gene is strong enough, or if biotechnologists need to experiment further. The Bt protein is harmless to humans and other mammals, as well as to birds, fish, many insects and other forms of life.
Horticultural Crops Research Laboratory, Fresno, CA
Patrick V. Vail, (209) 453-3000
University of California at Davis
Abhaya Dandekar/Gale H. McGranahan, (916) 752-0122

The latest report to Congress on USDA's human nutrition research and education activities covering FY 1990 is now available at no charge from the address below.

The **Briefs** is published quarterly by ARS Information. For further information or addition to the mailing list, contact Judy McBride, nutrition editor, at (301) 344-3932; or write me at Bldg. 419, BARC-East, Beltsville, MD 20705.